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Forming a Green Energy Coalition to Address Dysfunctional Energy Markets

Summary Recommendation: DOE should recommend establishing a regulated private sector Energy Coalition to improve performance of energy markets.

Although many reports show that something must happen to halt most carbon emissions sources, it doesn't identify the most likely catalyst that would catalyze the change, or assess and identify the best strategy to drive change from fossil fuels to green energy, and mitigate GHG emissions. The attached report reviews "Options to Address Climate Change" discusses the options generally mentioned, and then adds a new option: use a regulated private sector coalition to manage transition to more customer responsive energy and transportation sectors.

A Green Energy Coalition would invest to provide incentives to ramp green energy sources, reduce total loaded energy costs, improve effective use of energy, and increase carbon sinks. The Coalition will invest private sector capital to provide incentives to develop and deploy products and services to substitute for fossil fuels and increase carbon sinks. The Coalition should receive compensation, likely half of the reduction in customer costs for energy, in order to fund a growing annual investment budget. The best way to accomplish this, involves placing a pass-through tax on crude oil, tied to prices declining below the trend forecast.

Green Energy Coalition actions cause declining crude oil costs, particularly five to eight years out. In spite of the oil tax, oil product customers save more money than green vehicle buyers, but all energy customers save money from the transition to green energy sources.

Forming a Green Energy Coalition would cause rapid capital formation and investment to address currently dysfunctional markets. Green energy suppliers, green technology developers, and energy efficiency/conservation systems suppliers all benefit. The Coalition essentially creates a customer for new green tech products and services, and bridges the "Valley of Death" for green tech entrepreneurs.

The Green Energy Coalition works better than carbon tax schemes, government provided subsidies and loans, cap and trade markets for emissions, energy rules and mandates, or regulatory controls on emissions. The Coalition could make some of these programs much more successful; but without a private business sector entity driving investment (albeit under government oversight), none of these other options can deliver the results in the timeframe required. Without establishing the Coalition, customers get stuck with inferior products with a very expensive total cost, for a very long time.

The DOE should assemble the necessary information and submit a recommendation for the Obama administration to support the formation of a regulated joint private sector – public sector Green Energy Coalition; subject to government oversight and funded by a pass-through tax recapturing some of the customer cost savings on crude oil.

Dysfunctional Energy Markets Drive Customer Costs Higher

Identify key energy market performance indicators:

- Cost ratio of petroleum/natural gas compared to historical norms
- Energy costs as a percent of GDP
- Incremental cost of energy in each market; monopsony oil premium, natural gas marginal price based on supply/demand balance, peak electricity demand and pricing
- Energy market price swings and volatility
- Total costs including national security risks; lost economic benefits from failure to change more rapidly; and environmental costs due to AGW.
- Capital investment patterns in various markets
- Establishing long range goals and objectives, and analyzing progress

Evaluating the performance of the energy markets is complicated, with linkage to transportation sector, buildings and infrastructure, industrial use, agriculture, and water resources. Nevertheless, a number of key performance metrics allow some assessment of how well customers are being served. Key performance metrics show that the energy markets are currently dysfunctional, not serving customers well. The oil market and natural gas markets have fallen far short of pleasing customers for almost a decade, and even in the last 30-year period of 1975 to 2004, failed to meet expectations.

Start with the price of natural gas compared to the price of crude oil; for most of the last fifty years, the energy adjusted price of natural gas sold in the range of 70-90% of the energy adjusted price of crude oil. In the last several years, natural gas has sold in the range of $2-$4 per million BTU, only 11-26% of the energy adjusted crude oil price of $15-$18 per million BTU. This ratio falls well below the range of historical norms, and shows that either crude oil is priced too high, or natural gas is priced too low; or both. The change in this metric indicates problems in both energy markets.

One of the most important metrics available to evaluate energy cost calculates energy expenditures as a percentage of GDP. This ratio was steady, albeit declining slowly and steadily until OPEC began attempting to control the oil market in the 1970s; after OPEC formed, real energy costs rose rapidly until peaking over 12% of GDP around 1980; then began declining, with the downward trend accelerating with the collapse in oil prices in 1986. As the economy grew, and energy costs stagnated, with oil and natural gas below replacement costs, the ratio reached a low of 6% of GDP around 2000. Rising energy costs driven by increasing oil prices in the last seven years, coupled with lackluster GDP growth, brought energy costs to 8-9% of GDP over the last six years. This trend isn’t consistent with other commodity markets, which have seen declining shares of GDP as new products and services and increased demand for services (such as healthcare) take increasing portions of GDP and household expenditures.

Oil prices increased as global demand pushed up against global supply capacity constraints and caused the rise in energy spending (as a percentage of GDP). Although global supply increased, global demand increased more. This rise in oil cost can be mitigated either by increasing oil production volumes, improving fuel efficiencies, or increasing use of substitutes. In the last sustained period of oil price increases, 1974-1980, oil inflation was finally halted by improved energy efficiency and substitution, not by increased production. In the United States, gasoline consumption fell, and didn't reach the 1979 peak of 12 million barrels of daily demand until the 1990s.

In order to control oil prices in a range satisfactory to customers, requires decisions to invest and improve the effective use of energy, and increase use of substitutes. Higher global oil prices in recent years show the unregulated (or only partially regulated) oil market, and current levels of government incentives pushing fuel efficiency or substitution, don't effectively drive good decisions. Stronger actions are needed.

A key energy market indicator that should drive substitution is the incremental cost of the various energy sources. The oil, natural gas, and electric power markets all have capacity constraints, in local, regional, national, and global markets. As demand pushes up against these supply constraints, energy pricing soars. The incremental demand costs in these markets can push prices over 10x higher during demand surges or supply disruptions. In some markets, not only the price of the incremental demand energy supply increases, but also pricing of the entire energy supply increases. For example, crude oil prices increased as demand pushed against limited supply capacity, increasing costs for all crude oil customers. Taking into consideration the impact of higher prices across all the produced energy supply, and adding this to marginal pricing, results in a much higher effective cost of incremental demand than market price. Incremental costs reach levels as high as 25x the lower demand equilibrium pricing.

Because all the energy markets experience price rises to levels far above production costs when demand approaches capacity constraints in any part of the market; and because the energy price can fall far below total production cost (including investment recovery) when production exceeds demand; all the energy markets are subject to price instability with small changes in supply/demand balance. Energy prices can swing wildly, causing losses and high costs for both customers and suppliers. This happens in local and regional markets, and can happen in national and global markets. All of the energy markets in the United States have experienced these wild swings in the period since most methods to control unstable energy markets were abandoned around 1980. The last fifteen years have seen energy prices swings of approximately 3x in oil products, natural gas, and some regional electric power markets.

These irrational market energy prices also don't include major stakeholder costs such as national security issues caused by insecure energy sources, exacerbated by changing climate impacts on volatile regions of the world; lowered economic growth due to business failures due to unstable markets, and low growth in sectors like vehicle manufacturing, transportation infrastructure, biofuels, mass transit ridership, and slow development of critical green power sources; and potentially huge environmental risks and changes in northern hemisphere weather patterns triggered by anthropogenic climate change.

The run up in prices in the last decade due to dysfunctional energy markets misallocated hundreds of billions annually into energy producer pockets, and most of these dollars eventually were reinvested to increase production of more fossil fuels. Oil producers ended up ramping investment in more expensive projects, steadily increasing investment in frontier crude oil regions and unconventional sources of oil.

If the United States takes the actions and policy decisions outlined in this review, long-term energy costs should eventually fall to about 4% of GDP, with much of the decline occurring in the first fifteen years. Growth in the economy should outstrip increased energy costs and drive cost to a lower percentage of GDP, even considering the shift to 80% green energy markets over the same timeframe. Other industrial countries and key developing countries would use similar policies to improve their energy markets, substantially improving the performance of global energy markets.

<u>Current strategy to address energy markets:</u>

- 'Suppliers First' all-of-the-above approach
- Coupled with a belief in unregulated free markets
- Capital investors get the largest portion of subsidies and supports
- Policies avoid 'Pick-and-choose' technologies and solutions, instead use blanket investment subsidies and incentives covering everything
- Standard subsidies, such as the 10% ITC cover all solutions w.r.t. need in building the energy, transportation, housing, commercial buildings, and agricultural sectors of the future

Current strategy in the energy markets appears to pursue "all-of-the-above" development of energy sources, including green energy. The strategy is coupled with a belief in unregulated free markets. Although consumers buying energy efficient and green energy systems get tax subsidies or incentives, the bulk of the financial support goes to investors; and most investment dollars goes to fossil fuel projects. This approach essentially pushes a 'Suppliers First' strategy to energy markets.

With some exceptions, energy policies studiously avoid "picking and choosing" the best energy sources and energy technologies to support with meaningful financial support, and instead apply blanket investment subsidies and incentives to entire segments of the energy markets. The fundamental belief is that market competition will select the best technologies and systems, energy sources, and fix the 'insignificant' problems that currently exist with current energy markets. Many politicians and business representatives constantly demand removal or relaxation of regulations in the energy sector.

For example, the Texas Railroad Commission is currently under fire by political and government leaders in the state of Texas. The TRC was the first really effective regulatory agency controlling energy markets (particularly natural gas and petroleum markets), instituting regulations controlling well spacing, establishing prorated production levels, reducing gas flaring, requiring well completion methods to protect groundwater, and regulating produced water discharge or reinjection. These methods were copied nationally, and in many cases, globally. Unfortunately, some of the regulations don't adequately or effectively control problems in fractured shale field developments.

Not only does the current strategy intentionally avoid selecting the best methods to improve energy markets, most money "spent" in existing government programs use blanket tax subsidies that apply across the entire business world. For example, the 10% Investment Tax Credit helps all capital investors, costing the government hundreds of billions every year, often supporting projects inconsistent with supplying customers an optimal selection and mix of products and services.

The critical problem: No one is in charge of monitoring and evaluating energy consuming markets, and taking actions to ensure customers are best served by the resulting markets. Without a skilled organization constantly evaluating and adjusting investments and incentives, huge amounts of wasteful and ineffective expenditures get passed on as higher costs to customers. Even worse, many of these costs are deferred, and then passed to subsequent generations of Americans (customers), or to people and communities across the globe.

Recommended Strategy to improve energy markets:

- 'Customers First' approach to optimize all major stakeholders critical needs
- Use regulated and controlled markets to optimize stakeholder needs
- Subsidies and supports should drive better products and services
- Eliminate blanket subsidies and incentives – use incentives to optimize markets to best serve stakeholders
- Select most promising products and services to support, and continually update development plans and incentives

The energy markets need monitoring and evaluation for optimal performance. A 'Customers First' approach would effectively optimize all major stakeholder critical needs. The markets need some kind of control and regulation to drive deployment of better products and services, and avoid wasteful duplication and loss due to unproductive competition. Whoever is responsible should eliminate blanket subsidies and incentives that cost taxpayers without significantly improving market performance, and instead select specific incentives to optimize markets to better serve stakeholders. This task involves selection of the most promising products and services to support, and continually update incentives, development plans, and deployment progress in light of improved market performance.

Fortunately, as discussed in this review, this task is easier than it first appears. New management systems developed in the 1990s, and improved since then, can plan and execute the tasks needed to improve energy market performance. In particular, systems theories have improved substantially, and systems models layered on top of Total Quality Management (TQM) methods such as Quality Function Deployment (QFD) allow the design of products and services to meet a full suite of customer needs. The responsible organization makes the initial selection of products and services for inclusion in a broad mix of products for selected incentives; then as deployment assessment dictates, adjusts the mix of incentives to drive market performance improvement.

What is the aim of the economic system?

- Some economists claim the "invisible hand" serves both customers and suppliers
- Some claim the critical need is to avoid inflation at all costs… i.e. serve existing owners of capital
- Some economic theories claim the economy should serve workers
- Economic system should serve customers! And customers = stakeholders.
- Free market capitalism doesn't serve customers well because of the losses due to competition, and stifles innovation (which needs a system to support free enterprise)
- Innovation delivers better higher quality products and services for customers

- Many energy company management teams have a philosophy of make as much money as possible in the current environment, ignoring long term costs to customers (TTMAR strategy)
- Energy markets, and the economic system, should seek to optimize customer satisfaction
- Energy markets have failed to do this over the last 40 years
- See the 'invisible hand' in the pocket of customers, receiving inferior products at an extremely expensive total cost
- Optimizing involves addressing a full suite of customer needs, not simply availability and pricing; total cost over time is important
- Systems management tools and methods now exist that can be used by a skilled organization to optimize system performance to satisfy a full suite of needs

When evaluating energy markets, and the impact of related markets (such as transportation, housing, commercial buildings, industrial use, and agriculture), the aim of the economic system should be used to assess market performance.

Some economists claim that the "invisible hand" of competition best serves customers and suppliers, but the historical evidence from the energy markets belie this claim. The energy markets have never performed well when left to unregulated market competition. Unregulated oil and gas field development results in a tremendous waste of energy resource, huge environmental degradation impacts, wild price swings, and boom/bust economic impacts. To counter excessive waste, government agencies (such as the Texas Railroad Commission) stepped in to regulate and control the production of oil and gas. Other states and countries copied these regulations. Serious problems also surfaced due to unregulated markets in coal and electricity, leading to an encyclopedia of regulatory methods in these markets.

Some economists advocate that the economic system should serve owners of capital, with the objective of avoiding inflation at all cost, the critical requirement to accomplish this aim. In the 1980s, responding to inflation set off by rising energy costs (to over 12% of GDP), exacerbated by the accompanying price rises in food and other markets requiring energy input, then driven even higher by increasing wages linked to cost-of-living adjustments (COLA), monetarists advocated economic theories that caused the Fed to push short term interest rates over 14%. Industries responsible for building the long-term infrastructure suffered a serious downturn, hitting the Rust Belt particularly hard. In this episode, government agencies didn't assess a full suite of customer needs and other critical stakeholder needs, and this led to suboptimal decisions. The various entities within government were ill equipped to analyze the energy markets, and respond with appropriate policies that managed the economic impacts. This episode demonstrates both the difficulty with managing energy markets, and the inappropriate and ineffective use of only broad-based government policies to manage energy markets.

Some economic theories postulate that the economic system should primarily serve workers, and failures of these economic systems demonstrated the problems with this approach. None of the recommended aims for economic systems have worked well.

Economic systems should have the aim of addressing customer needs and pleasing customers over the long haul. Customers include important stakeholders, such as communities, general population, and future customers in the markets. Free market capitalism doesn't serve customers well because of the losses due to competition, and because it stifles innovation. Existing suppliers can use their financial dominance to control markets, preventing competitive new products, or use advertising to mislead customers. Free market capitalism also fails because this system doesn't have incentives to drive actions that in turn, ensure the needs of future generations.

Innovation delivers better higher quality products and services for customers, but requires a system to support free enterprise efforts. Most new innovative energy technology must receive consistent support over a sufficiently long period to build a supply chain and optimize the product or service. In many cases, the optimized new products and services serve customers and stakeholders better than the existing system. A key strategy to improve the functioning of energy markets includes actions bridging the "valley of death" for energy tech developers.

Many energy company management teams have a philosophy of make as much money as possible in the current environment, ignoring long term costs to customers (TTMAR strategy: "Take the Money and Run"). Energy markets have failed to serve important stakeholders over the last 40 years. The only time observers see the 'invisible hand'; they find this hand in the pocket of customers; who in turn received inferior products at a very expensive total cost.

Energy markets, and the economic system, should seek to optimize customer satisfaction. Some key market performance indicators were discussed above, but optimization requires in-depth assessment of critical market performance metrics.

Optimizing involves addressing a full suite of customer needs, not simply availability and pricing; total cost over time is important. Different energy markets have different sets of needs, with very different optimal solutions. Analyzing the market performance may seem overly complicated, but systems management tools and methods now exist that can be used by a skilled organization to optimize system performance to satisfy a full suite of needs. Applying these methods on the energy markets, even with a simple preliminary analysis, shows the current markets fall far short of optimally serving stakeholders.

<u>Energy Market Strategies and Policies: "Customers First" Approach</u>

- Problem: Each Energy Market is Different (With Different Customer/Stakeholder Needs)
- Recent Rising Energy Cost Drag on US Economy
- Household Energy Expenses
- Energy Policies: Set-up for Three-Case Comparison
    - Current Energy Policies ("Suppliers First")
    - Price GHG Emissions + Green Energy Standards
    - "Customers First" Energy Policies
- "Customers First' Energy Policies Work Better to Meet Customer Needs
- High Needs Tree level "Actions" versus "Needs" Matrix
- High level Needs: Reduce Total Cost, Decrease Environmental Risks, Increase Positive Economic Impact, and Reduce National Security Issues

The next set of comments pertains to the attached set of presentation slides in pdf format file named Customers First Energy Market Approach prepared in the fall of 2012. The first slide shows the title ‘Energy Market Strategies and Policies: “Customers First” Approach’, and the name of our company, Skibo Systems LLC.

Energy Market Strategies and Policies: “Customers First” Approach

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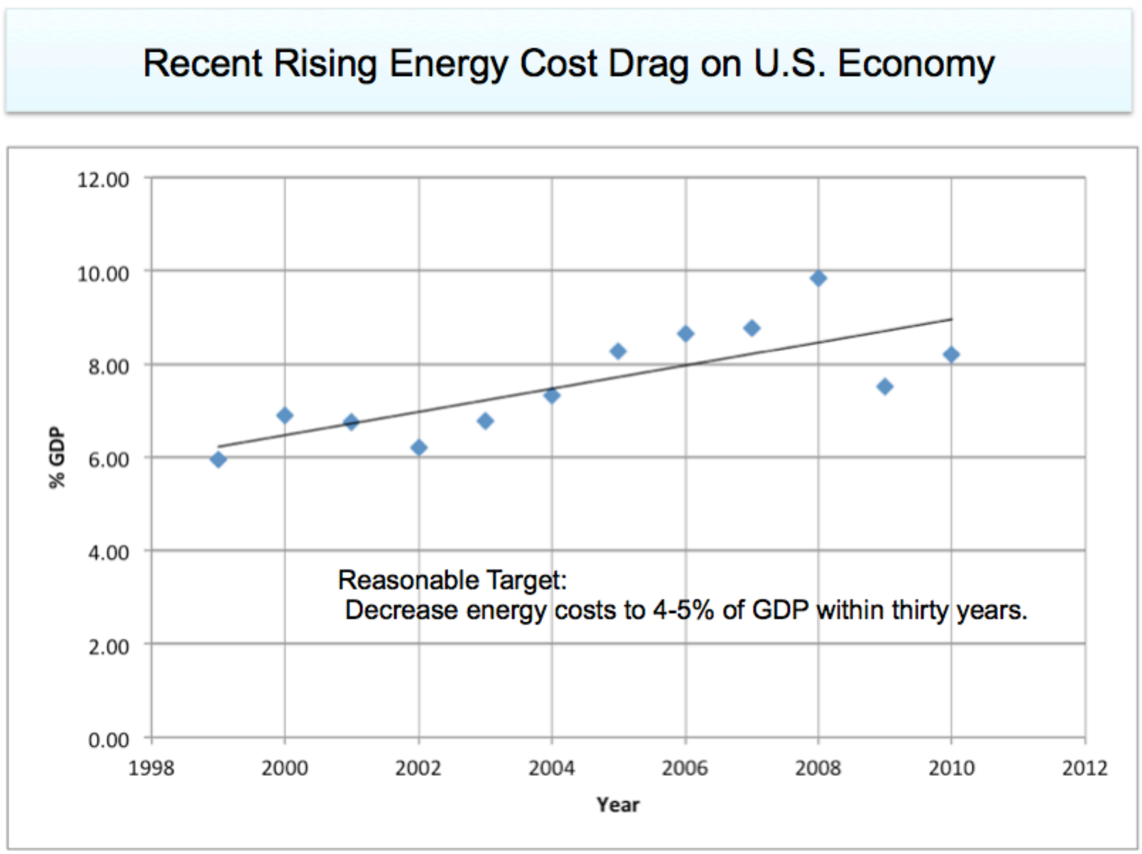
Problem: Each Energy Market is Different
(With Different Customer/Stakeholder Needs)

The three largest energy markets: vehicle fuels, electricity, and natural gas.

- Each energy market needs customized/optimized energy policies
  - Reaching an optimal solution set requires a knowledgeable “pick and choose” process.
  - A different set of optimal solutions work best for each energy market.
  - Different solutions have substantially different capital cost/ operating cost structures, with debt financing often the key to providing best value to stakeholders.
- Current energy policies rely on the value judgment “free market is best”.
  - Free energy markets have never functioned properly.
  - All the major energy markets currently exhibit dysfunctional outcomes inconsistent with perfect free market theories.
  - Using the “free market is best” value judgment to guide energy policies has increased customer and supplier costs substantially.
- The energy markets do not have level playing fields; privately owned projects receive subsidies larger than publicly owned projects.

The second slide “Problem: Each Energy Market is Different (With Different Customer/Stakeholder Needs)”, identifies the three largest energy markets: vehicle fuels, electricity, and natural gas. The key takeaway points is that each energy market needs customized/optimized energy policies, and that finding the optimal solution set requires a knowledgeable “pick and choose” process. Unfortunately, current energy policies rely primarily on the value judgment that free markets work best. But all the major energy markets currently exhibit dysfunctional outcomes inconsistent with perfect free market theories, and using this value judgment has increased customer and supplier costs substantially. Additionally, energy markets do not have level playing fields; privately owned projects often receive higher subsidies than publicly owned projects, especially considering green power projects.



The next slide points out the recent rising energy cost drag on the economy over the period 1999 to 2010, as energy costs rose from 6% of GDP to over 8% of GDP over the last six years of the period (and extended into the last three years). The fourth slide points out the components of household energy expenses, with vehicle fuels costing over half of energy costs. The historical data shows the energy cost up from 1999, but not as high as the 12% hit in 1980.

A target of 4% seems a reasonable target for 25 years hence, down from about 8.5 percent recently. One key parameter in hitting this target involves construction of large scale green energy projects that pay back their capital costs, but remain operating; thus leaving customers only paying for the much smaller operating and maintenance costs.

The other key parameter involves correcting problems in the vehicle fuels and crude oil markets that will cause declining transportation energy costs, albeit at a cost of slightly increased expenditures on vehicles.

Household Energy Expenses

Household Total Expenses approximately $50,000 annually include:
Housing energy expenses = $2000 annually (4.0%)

- Household electricity cost = $1300 annually (2.6%)
- Household natural gas or heating oil = $700 annually (1.4%)

Transportation fuel costs

- Gasoline and diesel expenses = $2300 annually (4.6%)
- Large variation with oil price

Household energy expenses are 8.6% of total expenses

Historical data:

- In 1980, expenses were approximately 12%.
- In 2000, expenses were approximately 7%.
- Over 90% of expenses are spent on fossil fuel based energy.

Reasonable Target:
In 2040, energy should comprise only 4% (four points) of total expenses.

- Fossil fuel based energy should comprise less than 1 point of this target.
- Green energy sources should comprise 3 points of this target.
- Vehicle fuels/energy should add 1 point to this target, comprising only 25% of household expenses versus 55% today.

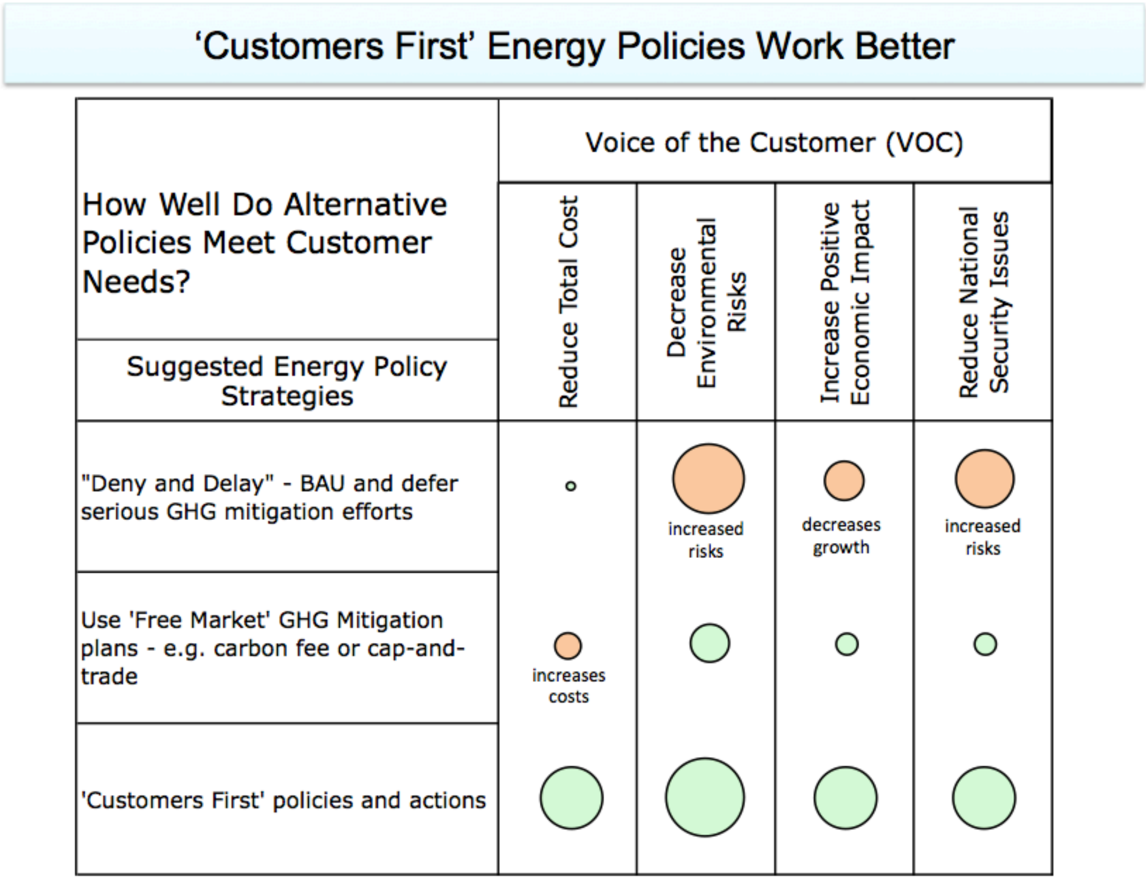
Please note that hitting the recommended target would permanently remove over 4% of household expenses, although offset by an increase of 1% of household expenditures spent on vehicle purchases. The savings would accrue every year after hitting this target. Vehicle fuel/energy costs decline to only a quarter of household energy costs, from over half today. Clearly this outcome represents a significantly different energy market, would have a major impact on families and businesses across America, and create very different energy markets. The improved markets should work much better compared to current markets.

Set-up for Three-Case Comparison

	Current Energy Policies ("Suppliers First")	Price GHG Emissions + Green Energy Standards	"Customers First" Energy Policies
Results and Outcomes	Use wars to secure energy supplies.	Raises energy prices; but energy costs level due to improved efficiency.	Lowers energy costs.
	Provides safe reliable market for high cost crude oil.	Relies on "free market" participants for intelligent decisions.	Relies on expert decision makers for important energy decisions
	Makes the World safe for …. … well, not for humans!	Helps make the world safe for people!	Saves our home planet!
	Depletes America's natural gas at low prices.	Reduces natural gas reserves quickly.	Conserves natural gas reserves for use over the long haul.
	Damages or destroys America's farms, ranches, forests, fisheries, coasts, etc.	Slow to mitigate substantial environmental degradation.	Best shot to substantially reduce environmental degradation.

This slide compares three cases of energy policies; the first case extrapolates current "Suppliers First" energy policies where the bulk of tax breaks and government support continues to go to fossil fuel energy providers. The second case is a mix of pricing GHG emissions and green energy standards and rules, presumably mixed with some government subsidies for green energy. The third case modifies energy policies to put "Customers First". This case sets up an economic system that rewards (green) energy suppliers and investors for improving energy markets to better serve customers. The customer needs are represented by the high level needs (on a needs tree) of reduced total costs, decreased environmental risks, increased positive economic impacts, and reduced national security issues. The three cases can be compared relevant to each high level need. The 'Customers First' plan reduces total costs, substantially reduces environmental risks, provides positive economic impacts, and reduces national security issues. No other set of policies can meet customer needs as well.

The review presented in these comments contains a preliminary analysis of the 'Customers First' strategy, compared with the BAU 'Suppliers First' strategy used for much of the last 35 years and essentially guiding the current energy markets. The review also discusses the proposed GHG Mitigation strategy and plans, where various government actions attempt to address global climate change issues. The comparison of the three cases shown in this slide summarizes the analysis and assessment. The conclusion: 'Customers First' energy strategy and resulting energy policies work much better than the alternative strategies.



<u>Examine the Oil Market First - Then Develop Plans for Natural Gas and Electricity</u>

Based on an initial overview analysis of key indicators of market performance, and assessing the four high level customer needs, the oil market stands out as the most problematic energy market. The crude oil market and related markets easily comprises the highest source of energy cost, costing US refineries over $600B annually, with the wholesale electricity market costing over $350B, and natural gas at less than $150B. Oil products also contribute the largest source of carbon emissions, with coal in second place. In terms of energy pricing, wholesale electricity has the highest energy price (due to conversion losses in generating stations), with crude oil at about 60% of the electricity energy price, and natural gas at less than 25% of the average electricity busbar price.

National security issues with crude oil supply causes the most concern domestically, although overseas, electricity availability and natural gas supply issues can rival oil supply concerns. The economic impacts of oil and related transportation markets have the biggest economic impact on the United States, when compared to other energy markets. Therefore the analysis plan in this review, tackles problems and issues in the crude oil market first, then develops strategies and plans for natural gas, electricity, and coal. The next section of this energy markets review covers the crude oil market.